

Online Appendix

Supplement to: ZIP Code Level Estimates from a Local Health Survey: Added Value and Limitations

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Table S1. All 37 questions from the 2009-2013 ZIP-Code level CHS dataset that the study tested for reliable criteria. Source: NYC Community Health Survey, 2009-2013. 2009-2013 data are weighted to the NYC adult residential population as per the American Community Survey, 2009-2013.

Domain	Questions	Response	Note	Reliable over 50% ZIP Codes
General Health	Would you say in general that your health is: excellent, very good, good, fair or poor?	1=Excellent 2=Very good 3=Good 4=Fair 5=Poor .d=Don't know .r=Refused	Recoded to match "self-reported health status" in Take Care NYC	Yes
Access/ Health Insurance	Type of insurance coverage	1=Yes 2=No .d=Don't know .r=Refused . = Missing		Yes
	Was there a time in the past 12 months when you needed medical care but did NOT get it? Medical care includes doctor's visits, tests, procedures, prescription medication and hospitalizations.	1=Yes 2=No .d=Don't know .r=Refuse	This is a TAKE CARE NYC variable	Yes
Cardio-vascular Health	Have you ever been told by a doctor, nurse or other health professional that you have hypertension, also called high blood pressure?	1=Yes 2=No .d=Don't know .r=Refused		Yes
Diabetes	Have you ever been told by a doctor, nurse or other health professional that you have diabetes?	1= Yes 2= No .d= Don't know .r=Refused	Women who had diabetes only while pregnant are included in 'no' category	Yes

Domain	Questions	Response	Note	Reliable over 50% ZIP Codes
Asthma	Have you ever been told by a doctor, nurse or other health professional that you had asthma?	1= Yes 2= No .d= Don't know .r=Refused		Yes
	In the last 12 months, have you had an episode of asthma or an asthma attack?	1= Yes 2= No .d= Don't know .r=Missing/Not Asked		No
Nutrition	How many total servings of fruit and/or vegetables did you eat yesterday? A serving would equal one medium apple, a handful of broccoli, or a cup of carrots.	0 – 50 .d= Don't know .r=Refused		Yes
	How often do you drink sugar sweetened soda per day? Do not include diet soda or seltzer.	0 – 23 .d=Don't know .r=Refused . = Missing/outliers	Recoded to match “sugar drinks” in Take Care NYC	Yes
	How often do you drink other sweetened drinks like sweetened iced tea, sports drinks, fruit punch or other fruit-flavored drinks per day? Do not include diet soda, sugar free drinks, or 100% juice.	0 – 23 .d=Don't know .r=Refused . = Missing	Recoded to match “sugar drinks” in Take Care NYC	Yes
Physical Activity	During the past 30 days, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?	1= Yes 2= No .d= Don't know .r= Refused		Yes
	In the past 12 months, how often have you ridden a bicycle in one of the five boroughs of NYC?	1=Several times a month 2=At least once a month 3=A few times a year 4=Unable to ride bike 5=Never .d= Don't know .r= Refused	Recoded to A few times a year or more/Never o or unable to ride bike to achieve reliability	In some categories

Domain	Questions	Response	Note	Reliable over 50% ZIP Codes
Tobacco and Second Hand Smoking	Have you smoked at least 100 cigarettes in your entire life? Do you now smoke cigarettes: everyday, someday, or not at all?	1=Never 2=Current 3=Former .d=Don't know .r=Refused		Yes
	Smoke every day vs. some days	1=Yes, every day 2=No, some days .d=Don't know .r=Refused .=Missing/Not Asked	Denominator is persons who currently smoke	No
	# cigs smoked/day every & someday smokers, continuous (imputed for missing & adjusted for days smoked)	0-140 .=Missing/Not asked	Denominator is persons who currently smoke	No
	About how long has it been since you last smoked cigarettes regularly?	1=Within past month 2=More than 1-3 months 3=More than 3-6 months 4=More than 6-12 months 5=More than 1-5 yrs 6=More than 5-10 yrs 7=More than 10 yrs .=Missing/not asked		No
	During the past 12 months, have you stopped smoking for 24 hours or longer because you were trying to quit smoking? About how long has it been since you last smoked cigarettes regularly	1= Yes 2= No .=Missing/Not asked	Former smokers who quit in past year (<=12months) are included in 'Yes'.	No
	Those who quit in the past year vs >1 yr ago	1=0-12 months ago 2=>1year ago	Denominator is persons who are former smoker	No
	Where did you get that? [Follows: Was the last cigarette you smoked from a carton, a pack, a single or a loosie, bummed, or did you roll your own?]	1=New York City 2=Store in NYC 3=Person/street NYC 4=Person/street location unknown	Denominator is current smokers whose last cigarette came	No

Domain	Questions	Response	Note	Reliable over 50% ZIP Codes
		5=Store location unknown 6=In NYS, out NYC 7=In other state 8=Internet or mail 9=Indian Reserv 10=Outside US 11=Airport 12=Duty free 13=Other .u=Unknown location cig purchase .r=Missing/Not asked	from carton, pack or single/loosie	
Immunizations	During the past 12 months, have you had a flu shot in your arm or a flu vaccine that was sprayed in your nose?	1=Yes 2=No .d=Don't know .r=Refused		Yes
	Did you have a flu shot in your arm or a flu vaccine that was sprayed in your nose during last year's flu season, between the dates of September 1 and March 31?	1=Yes 2=No .d=Don't know .r=Refused		Yes
Cancer Screening	Colonoscopy is an exam in which a tube is inserted in the rectum to view the bowel for signs of cancer or other health problems. Have you ever had a colonoscopy?	1=Yes 2=No .d=Don't know .r=Refused . =Missing/Not asked		Yes
	When was your most recent colonoscopy performed?	1=Less than 10 yrs ago 2=Never or >10yr .d=Don't know .r=Refused . = Missing/Not asked	Denominator is persons 50+ yrs	Yes
HIV	Have you had an HIV test in the last 12 months?	1=Yes 2=No .d=Don't know .r=Refused		Yes

Domain	Questions	Response	Note	Reliable over 50% ZIP Codes
	Have you ever had an HIV test?	1=Yes 2=No .d=Don't know .r=Refused		Yes
Sexual Behavior	Number of male and female sex partners in the past 12 months	1=None 2=One 3=Two 4=Three or more . =Missing	Recoded to one or under vs. over one	No
	Sexually active in past 12 months	1=Yes 2=No . =Missing		Yes
	Women who have sex with women, past 12 months	1=Yes 2=No . =Missing/Not asked	Denominator is sexually active women	No
	Women who have sex with women, exclusively in past 12 months	1=Yes 2=No . =Missing/Not asked	Denominator is sexually active women	No
	Men who have sex with men, past 12 months	1=Yes 2=No . =Missing/Not asked	Denominator is sexually active men	No
	Men who have sex with men, exclusively in past 12 months	1=Yes 2=No . =Missing/Not asked	Denominator is sexually active men	No
	The last time you had sex, did you use a condom?	1=Yes 2=No .d=Don't know .r=Refused . =Missing/Not asked	Among those sexually active in last 12 months	No
	In the past 12 months, have you had anal sex?	1=Yes 2=No .d=Don't know .r=Refused . =Missing/Not asked	Denominator is WSM and MSWM	No
	In the past 12 months, when you have had anal sex have you or your partner used a condom?	1=Every time 2=Some of the time 3=Never .d=Don't know .r=Refused . =Missing/Not asked	Denominator is those report anal sex	No

Domain	Questions	Response	Note	Reliable over 50% ZIP Codes
Alcohol	During the past 30 days, how many days per week or per month did you have at least 1 drink of any alcoholic beverage? A drink of alcohol is 1 can or bottle of beer, 1 glass of wine, 1 can or bottle of wine cooler, 1 cocktail, or 1 shot of liquor.	0 – 30.1 .d=Don't know .r=Refused	Continuous measure standardized to days per month	Yes
	On the days when you drank, about how many drinks did you drink on average? Standardized to average number of drinks per day in last 30 days)	0 - 50 .d=Don't know .r=Refused . = Missing		Yes
Demographic	BMI	1=Und/norm: bmi<25 2=Overwt: 25≤bmi<30 3=Obese: 30≤bmi≤100 . = Missing	Recoded to match "obesity" in Take Care NYC	Yes

Table S2. The table presents 1) New York City citywide CHS estimates and 95% CI's, 2) the proportion of United Health Fund (UHF) areas showing heterogeneous ZIP Code estimates, 3) significant linear trend from 2009 through 2013 for all variables that yielded reliable estimates in at least 50% of the ZIP Codes. For binary variables, the table presents the prevalence of the first category (e.g., yes for a variable with yes/no levels). * denotes continuous variables. Source: NYC Community Health Survey, 2009-2013. 2009-2013 data are weighted to the NYC adult residential population as per the American Community Survey, 2009-2013.

Domain	Question	Categories*	Crude prevalence estimates or mean (95% CI)	% ZIP Codes with reliable estimates	% 34 UHFs with reliable estimates in CHS2011	% UHFs showing heterogeneity	% UHFs showing significant linear trend
General Health	Would you say in general that your health is: excellent, very good, good, fair or poor?	Fair, Poor / Excellent, Very good, Good	21.5 (20.9- 22.1)	98.4%	67.6%	12.5%	11.8%
Access/ Health Insurance	Insurance coverage	Yes/No	80.8 (80.1- 81.4)	77.3%	35.3%	25.0%	17.6%
	Was there a time in the past 12 months when you needed medical care but did NOT get it? Medical care includes doctor's visits, tests, procedures, prescription medication and hospitalizations.	Yes/No	11.5 (11.0-12.0)	74.2%	35.3%	9.4%	2.9%
Cardiovascular Health	Have you ever been told by a doctor, nurse or other health professional that you have hypertension, also called high blood pressure?	Yes/No	28.0 (27.4-28.6)	99.2%	67.6%	12.5%	0.0%
Diabetes and obesity	Have you ever been told by a doctor, nurse or other health professional that you have diabetes?	Yes/No	10.1 (9.7-10.5)	80.5%	55.9%	21.9%	14.7%
	BMI	Obese BMI \geq 30 / Under, normal, overweight BMI<30	23.5 (22.9-24.0)	97.7%	55.9%	15.6%	2.9%

Domain	Question	Categories*	Crude prevalence estimates or mean (95% CI)	% ZIP Codes with reliable estimates	% 34 UHFs with reliable estimates in CHS2011	% UHFs showing heterogeneity	% UHFs showing significant linear trend
Asthma	Have you ever been told by a doctor, nurse or other health professional that you had asthma?	Yes/No	11.9 (11.4-12.3)	82.8%	44.1%	15.6%	11.8%
Nutrition	How many total servings of fruit and/or vegetables did you eat yesterday? A serving would equal one medium apple, a handful of broccolis, or a cup of carrots.	*	2.4 (2.3-2.4)	100%	100%	50.0%	0.0%
	Consumes one or more sugar sweetened beverages (soda + other sweetened drinks) on average per day	Yes/No	29.1 (28.4-29.8)	90.6%	35.3%	18.8%	35.3%
Physical activity	During the past 30 days, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?	Yes/No	74.9 (74.3-75.5)	96.9%	76.5%	12.5%	20.6%
	In the past 12 months, how often have you ridden a bicycle in one of the five boroughs of NYC?	At least once/Never or unable to ride a bike	21.7 (21.1-22.3)	93.8%	50.0%	25.0%	5.9%
Tobacco and Second-hand Smoking	Have you smoked at least 100 cigarettes in your entire life? Do you now smoke cigarettes: everyday, someday, or not at all?	Current /Never or Former	15.5 (14.9-16.0)	94.5%	55.9%	3.1%	0.0%

Domain	Question	Categories*	Crude prevalence estimates or mean (95% CI)	% ZIP Codes with reliable estimates	% 34 UHF's with reliable estimates in CHS2011	% UHF's showing heterogeneity	% UHF's showing significant linear trend
Immunizations	During the past 12 months, have you had a flu shot in your arm or a flu vaccine that was sprayed in your nose?	Yes/No	37.0 (36.3-37.6)	93.0%	44.1%	9.4%	41.2%
	Did you have a flu shot in your arm or a flu vaccine that was sprayed in your nose during last year's flu season, between the dates of September 1 and March 31?	Yes/No	31.6 (30.9-32.2)	95.3%	50.0%	9.4%	44.1%
Cancer Screening	Colonoscopy is an exam in which a tube is inserted in the rectum to view the bowel for signs of cancer or other health problems. Have you ever had a colonoscopy?	Yes/No	69.2 (68.2-70.1)	55.5%	20.6%	9.4%	2.9%
	When was your most recent colonoscopy performed?	<10 yrs ago/Never or ≥10 yrs	66.8 (65.9-67.7)	51.6%	11.8%	6.3%	2.9%
HIV	Have you had an HIV test in the last 12 months?	Yes/No	32.3 (31.6-33.0)	87.5%	32.4%	28.1%	2.9%
	Have you ever had an HIV test?	Yes/No	60.8 (60.1- 61.5)	89.8%	38.2%	34.4%	5.9%
Sexual Behavior	Number of male and female sex partners in the past 12 months	More than one/ one or none	13.1 (12.6-13.7)	65.6%	17.6%	9.4%	5.9%
	Sexually active in past 12 months	Yes/No	71.7 (71.1- 72.4)	96.1%	52.9%	9.4%	8.8%

Domain	Question	Categories*	Crude prevalence estimates or mean (95% CI)	% ZIP Codes with reliable estimates	% 34 UHFs with reliable estimates in CHS2011	% UHFs showing heterogeneity	% UHFs showing significant linear trend
Alcohol	During the past 30 days, how many days per week or per month did you have at least 1 drink of any alcoholic beverage? A drink of alcohol is 1 can or bottle of beer, 1 glass of wine, 1 can or bottle of wine cooler, 1 cocktail, or 1 shot of liquor.	*	4.4 (4.3-4.5)	100%	100%	68.8%	5.9%
	On the days when you drank, about how many drinks did you drink on average? Standardized to average number of drinks per day in last 30 days	*	0.4 (0.4-0.4)	100%	100%	62.5%	0.00%

Table S3. Proportion of variables 1) whose ZIP-Code level estimates reveal heterogeneity within the larger UHF neighborhood that they are nested within, and 2) whose UHF level estimates showed significant linear trends from 2009 through 2013. Heterogeneity of ZIP-Code level estimates in two UHF's - Kingsbridge and Sunset Park – cannot be assessed, because the ZIP-Codes in the two UHF neighborhoods had fewer than 30,000 residents according to the 2010 Census, and thus were combined with each other to make a single grouped estimate. Source: NYC Community Health Survey, 2009-2013. 2009-2013 data are weighted to the NYC adult residential population as per the American Community Survey, 2009-2013.

34 United Health Fund Neighborhoods (Number of observations; Number of ZIP Code Groups)	% of variables showing ZIP Code level heterogeneity (N=22)	% of variables showing significant linear trend (N=22)
101 Kingsbridge (747; 1)	NA	9.1%
102 NE Bronx (956; 3)	27.3%	13.6%
103 Fordham-Bronx Pk (1083; 3)	18.2%	22.7%
104 Pelham-Throgs Neck (1257; 5)	36.4%	27.3%
105/106/107 South Bronx (3259; 9)	9.1%	22.7%
201 Greenpoint (746; 2)	31.8%	9.1%
202 Downtown-Heights-Slope (1250; 5)	18.2%	13.6%
203 Bed Stuy-Crown Heights (1361; 5)	22.7%	18.2%
204 East New York (1102; 2)	13.6%	13.6%
205 Sunset Park (623; 1)	NA	4.6%
206 Borough Park (1056; 4)	22.7%	4.6%
207 Flatbush (1157; 4)	9.1%	27.3%
208 Canarsie (924; 2)	22.7%	18.2%
209 Bensonhurst (874; 3)	27.3%	4.6%
210 Coney Island (1162; 4)	13.6%	4.6%
211 Williamsburg-Bushwk (1138; 3)	22.7%	4.6%
301 Washington Heights (1624; 5)	4.6%	13.6%
302 Central Harlem (1263; 3)	18.2%	4.6%
303 East Harlem (836; 2)	4.6%	9.1%
304 Upper West Side (1536; 3)	22.7%	9.1%
305/307 Upper East Side-Gramercy (2597; 7)	18.2%	13.6%
306/308 Chelsea-Village (2174; 5)	13.6%	0.0%

34 United Health Fund Neighborhoods (Number of observations; Number of ZIP Code Groups)	% of variables showing ZIP Code level heterogeneity (N=22)	% of variables showing significant linear trend (N=22)
309/310 Union Square-Lower Manhattan (1915; 4)	54.5%	4.6%
401 LIC, Astoria (1009; 5)	18.2%	9.1%
402 West Queens (1515; 5)	31.8%	0.0%
403 Flushing (1244; 4)	36.4%	13.6%
404/406 Bayside Little Neck-Fresh Meadows (1225; 4)	9.1%	9.1%
405 Ridgewood (1094; 3)	36.4%	0.0%
407 SouthWest Queens (1106; 5)	9.1%	13.6%
408 Jamaica (1342; 3)	13.6%	4.6%
409 SouthEast Queens (1082; 4)	22.7%	9.1%
410 Rockaway (728; 2)	31.8%	4.6%
501/502 Northern SI (1496; 4)	22.7%	18.2%
503/504 Southern SI (1988; 4)	18.2%	22.7%

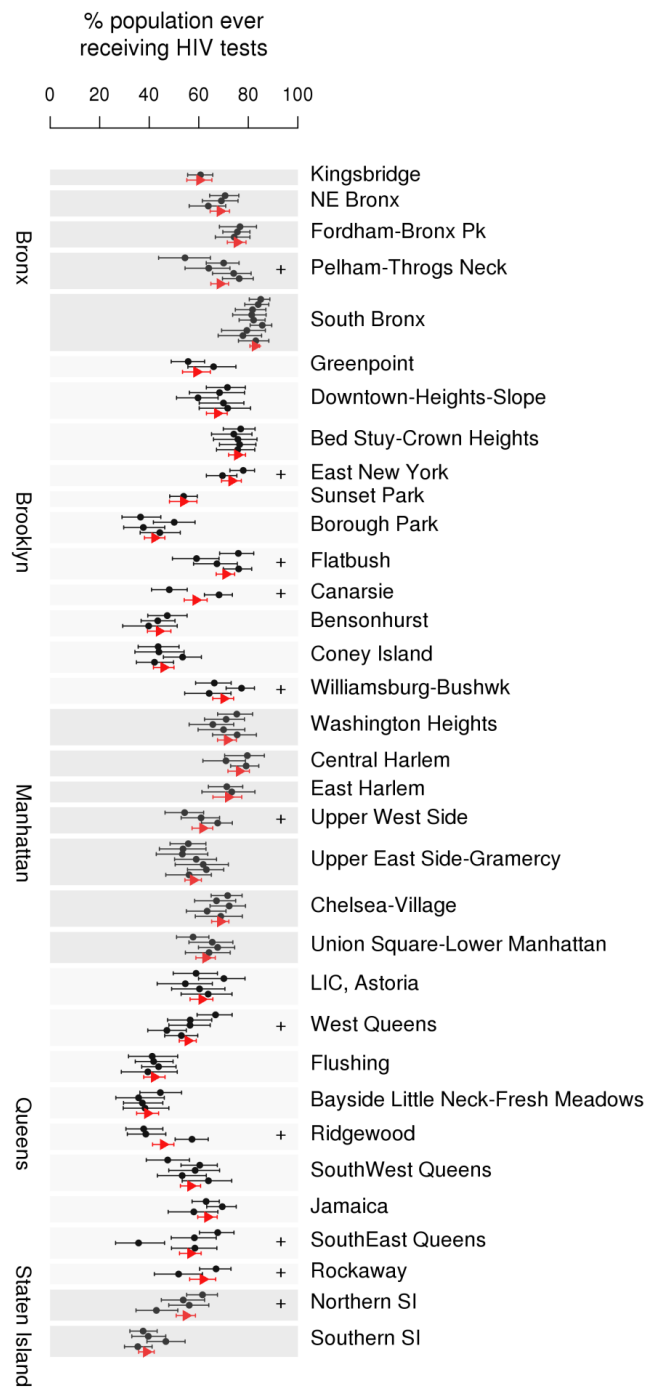


Figure S1. UHF level (red) and ZIP Code level (black) estimates and 95%CI of percentage of population reported to have ever received an HIV test. + denotes the UHFs where the nested ZIP Code level estimates show statistically significant heterogeneity. Source: NYC Community Health Survey, 2009-2013. 2009-2013 data are weighted to the NYC adult residential population as per the American Community Survey, 2009-2013.

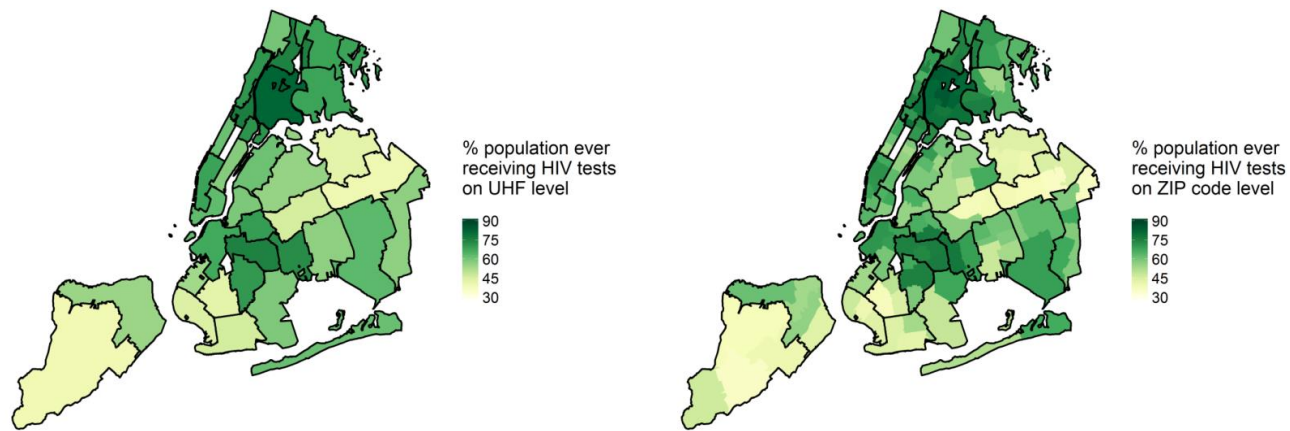


Figure S2. UHF level and ZIP Code level estimates of percentage of population reported to have ever received an HIV test. Source: NYC Community Health Survey, 2009-2013. 2009-2013 data are weighted to the NYC adult residential population as per the American Community Survey, 2009-2013.